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OBSERVATIONS ON THE FEEDING HABITS OF ROBBER FLIES. PART I.

PROCTACANTHUS RUFUS WILL. AND *P. BREVI-
PENNIS* WIED.

BY S. W. BROMLEY.

Massachusetts Agricultural College, Amherst, Mass.

One of the characteristic insects of the sandy plains along the Quinnipiac river in southern Connecticut during the hot sunny days of July is the large and handsomely-colored robber-fly, *Proctacanthus rufus* Will. Its rusty-orange abdomen and swift, undulating flight as it starts up in advance of the collector make it very conspicuous. The frequency with which one is seen bearing away some large insect that it has captured invites attention to what particular species are being taken.

The flies are very active and hard to approach, taking wing at the slightest movement and flying long distances before again alighting. In fact, the only times that they are at all easily captured is when they are encumbered with prey, and even then they are very wary and when disturbed carry such large prey as *Polistes* several rods before they again settle down. Because of these habits, it was very exasperating to stalk an individual over the hot sands only to have the specimen take flight just as the net was poised for the stroke.

Of the prey taken, all were of the order Hymenoptera. I did not see them attack species of any other order, although it is probable that they would capture Hymenoptera-resembling Diptera if opportunity offered. No attention was paid by them to the Lepidoptera and Odonata that occasionally drifted over the sands.

For aid in determining the species recorded, both from *P. rufus* and *P. brevipennis*, I wish especially to thank Dr. W. E. Britton of the Conn. Exp. Station who allowed me access to the Station collection, and to Dr. H. T. Fernald for the use of the Massachusetts Experiment Station collection.

The insects taken from *P. rufus* are as follows:

Sex of Fly	Date	Locality	Prey
1. ♀	July 2, '22	Hampden, Conn.	<i>Vespa vidua</i> Sauss. (queen)
2. ♀	"	"	<i>Polistes variatus</i> Cresson. (worker)
3. ♀	"	"	<i>Apis mellifera</i> L. (worker)
4. ♀	July 8, '22	"	<i>Polistes pallipes</i> LePel. (worker)
5. ♀	"	"	"
6. ♂	"	"	<i>Apis mellifera</i> L. (worker)
7. ♀	"	"	"
8. ♀	"	"	"
9. ♂	"	"	"
10. ♀	"	"	"
11. ♀	"	"	"
12. ♂	"	"	"
13. ♀	"	"	"
14. ♀	"	"	"
15. ♀	"	"	"
16. ♀	"	"	<i>Pompiloides tropicus</i> L. ♀
17. ♀	July 16, '22	Wallingford, Conn.	<i>Apis mellifera</i> L. (worker)
18. ♀	"	"	"
19. ♀	"	"	"
20. ♂	"	"	<i>Polistes pallipes</i> LePel. (worker)
21. ♀	"	"	<i>Microbembex monodonta</i> Say. ♀
22. ♂	"	"	<i>Tiphia inornata</i> Say. ♀
23. ♀	"	"	"
24. ♂	"	"	<i>Elis interrupta</i> Say. ♂
25. ♂	"	"	<i>Amblyteles rufiventris</i> Brullé.
26. ♂	"	"	<i>Hemipogonius</i> sp? ♀

Summarized Table of Prey

Hymenoptera.

14	<i>Apis mellifera</i> L.	1	<i>Elis interrupta</i> Say.
3	<i>Polistes pallipes</i> Le Pel.	1	<i>Pompiloides tropicus</i> L.
2	<i>Tiphia inornata</i> Say.	1	<i>Hemipogonius</i> sp?
1	<i>Vespa vidua</i> Sauss.	1	<i>Microbembex monodonta</i> Say.
1	<i>Polistes variatus</i> Cresson.	1	<i>Amblyteles rufiventris</i> Brullé.

From this may be seen that over 50% of the prey taken from the flies consisted of honey-bee workers. The explanation of the presence of so many bees in such an uninviting environment as these sand areas is this: beyond the western edges of the fields where I made these observations were banks of sumac to and from which the bees were continually streaming, many taking their course over the sand plains not more than ten or fifteen feet from the ground. It was from these that the robber-flies took heavy toll. Where the flies were most abundant I often saw one sweep upward and grasp a bee, only to fly so far with its prey as I approached that I was unable to locate it and obtain the record.

Several honey-bees that were taken from the flies were afterwards dissected and examined by Mr. R. E. Snodgrass of the Bureau of Entomology, with whom I was staying at the time, and myself. A specimen that the fly had dropped because it had consumed all parts possible was found to be nothing but an empty shell. Nearly all of the digestive, nervous, and muscular systems had been dissolved, probably by the introduction of an enzyme, and sucked out. The poison sac was intact, as was the tracheal system and all chitinated portions. A bit of the small intestine and unrecognizable pieces of other organs remained in the body cavity, but most of the internal structures were gone. Examination of others in different stages of consumption showed the muscle tissue of the thorax reduced to a shredded mass and the muscles and brain in the head-capsule disintegrated. Whether or not this was accomplished by an enzyme secreted by the salivary glands, I do not know. Further work might determine this point.

An interesting point noted in watching the flies was the fact that although *Psammocharids* were the predominating and most conspicuous hymenopterous insects flying over the plains, the flies seemed to have trouble in capturing these. I watched them dart at these wasps on several occasions but the wasps eluded them by dropping to the ground and running through clumps of bunch-grass. They are occasionally captured, however, and I was able to take the flies preying upon *Psammo-*

charids in two instances, as shown by the list, but I never had the good fortune of seeing any in the act of capturing the wasps.

Females of *P. rufus* were watched for oviposition habits. No attempts were seen to be made, but empty pupa cases were seen protruding from the sand. These, because of their size, were evidently of this species, indicating the underground life of the immature stages.

Recently, through the kindness of Mr. Nathan Banks, I was allowed to examine the collection at the M. C. Z. where two records of this species with prey were obtained.

♀ *P. rufus*: prey, *Polistes* sp? Woods Hole, Mass., VII, 19, 1893. A. P. Morse, Coll.

♀ *P. rufus*: prey, *Bremus* sp? ♂ West Springfield, Mass., VII, 26, 1915. H. E. Smith, Coll.

Proctacanthus rufus seems to be restricted to sandy areas such as those above mentioned and I have never taken it in the fields and pastures frequented by *P. philadelphicus* except those in the immediate vicinity of the sand areas. That the insect is not more widely spread is a fortunate thing for bee-keepers.

Another Asilid found in the same sandy areas as the above but less conspicuous and active is *Proctacanthus brevipennis* Wied. This belongs to the same genus but is smaller and more of the color of the sand on which it alights. I found it to be far less abundant than its larger relative in the area studied.

It will be seen from the list of prey that the type of insects captured by this species is quite different from that taken by the last. Here half the species recorded were specimens of the beetle *Anomala lucicola* Fab. which is common on the sand fields and captured during flight, as is the case of all prey taken.

The list of insects taken from *P. brevipennis* is as follows:

Sex of Fly	Date	Locality	Prey
1. ♀	July 8, '22	Hampden, Conn.	<i>Anomala lucicola</i> Fab.
2. ♀	"	"	"
3. ♀	July 16, '22	Wallingford, Conn.	<i>Formica fusca</i> var? ♂
4. ♀	"	"	<i>Anomala lucicola</i> Fab.
5. ♀	"	"	<i>Zelus exsanguis</i> Stal. ♀
6. ♂	July 23, '22	"	<i>Sarcophaga</i> sp?

Summarized Table of Prey.

Coleoptera		Diptera	
3	<i>Anomala lucicola</i> Fab.	1	<i>Sarcophaga</i> sp?
Hymenoptera		Hemiptera	
1	<i>Formica fusca</i> var?	1	<i>Zelus exsanguis</i> Stal.

McAtee and Banks in their paper on the Asilidae of the District of Columbia (Proc. Ent. Soc. Washington, vol. 22. p. 26) record *P. brevipennis* as feeding upon *Anomala* sp. This fly evidently has a predilection for this genus of beetles.

Most of the prey from both species were taken from females, as one would naturally expect to be the case in predacious insects, for they are larger and more powerful than the males and require more stored-up energy for the discharge of of their sexual functions.

NOTES ON THE DIPTEROUS FAMILY CYRTIDÆ.

By F. R. COLE.

Stanford University, California.

In 1919 the writer published a revision of the Cyrtidæ of North America (Trans. American Ent. Soc., XLV, 1-79). There are some mistakes and omissions in this paper which should be corrected and some notes have accumulated on various species of the group.

Eulonchus marginatus O. S. There are two specimens of this apparently rare species in the collection of the California Academy of Sciences, taken at Sobre Vista, Sonoma Co., Cal., May 8 (Kusche).

Ocnæa helluo O. S. A specimen taken at College Station, Texas, was sent to the writer by Mr. H. J. Reinhard. It is 12.5 mm. in length and answers the original description in most respects; it differs in that all the longitudinal veins reach the wing margin. In each wing there is an adventitious cross-vein in cell M-3, one in cell 1st R-5 in one wing and one in cell R-1 in both wings (see fig. 1).

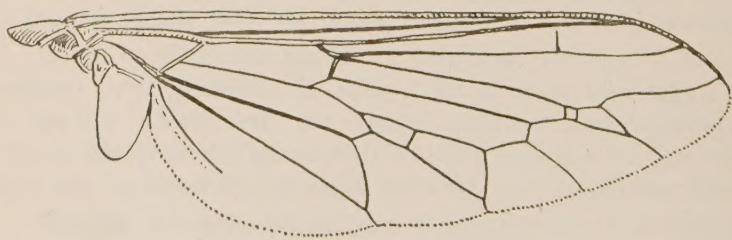


Fig. 1. *Ocnæa helluo* O. S., wing.

Acrocera liturata Will. The writer has one specimen taken at Los Gatos, Cal., June 20, 1917. This is a female with very little black at the base of the scutellum. There is more yellow on the abdomen than in the typical description. The species is evidently quite variable in coloration. Length 3 mm.

Acrocera hubbardi Cole. There are several specimens of this species in the collection of the Calif. Acad. of Sciences and most of them are typical. Specimens taken at Crystal Lakes, San Mateo Co., Cal., June 25, 1916 (E. P. Van Duzee) have the scutellum entirely black and less yellow on the abdomen than in the typical specimens; vein R-1 is brown, the rest of the wing veins yellow, including the costa, the membrane hyaline. Other specimens were taken at Sisson, July 25 (E. P. Van Duzee), Santa Cruz, June 8 (Giffard) and Oakland, August, 1905 (E. P. Van Duzee), all in California.

Ogcodes albicinctus Cole new name for *O. marginatus* Cole which is preoccupied by *O. marginatus* Meigen, a synonym of *O. pallipes* Latreille. The length, omitted in the original description, is 4-4.5 mm. A series of specimens received from Mr. B. C. Cain, taken at Brentwood Lodge, Bear Lake Co., Idaho, July 17, 1920, probably belong here but are not quite typical, the pile of the thorax not being unusually long; the femora are yellow on less than the apical third. The genitalia are distinct from *O. costatus*, but no males of *melampus* were available for comparison.

Ogcodes albiventris Johnson. There is a male specimen in the collection of the Cal. Acad. of Sciences, taken at Livermore, Cal., August 1904 (F. X. Williams). The abdomen is largely white; the first segment of the abdomen has a large basal black spot, separated from the posterior margin by the white border; the second, third and fourth tergites have a narrow, transverse black band at the base and one of about equal size near the posterior margin, a black mark connects the bands on the second and third segments; the fifth segment has a narrow anterior and posterior black margin, the latter interrupted in the middle and not quite reaching the posterior margin. The venter differs from the typical description in having a basal black band on sternites 1, 4 and 5, a small round spot on each side on the second and third sternites. The length is 5.25 mm. The sex of the type is not given and the differences in color may be due to a difference in sex.

Ogcodes rufoabdominalis Cole. The length was omitted in the original description and should be 4.25-5.5 mm. Specimens of this species were kindly loaned by Mr. McAtee from the collection of the U. S. Biological Survey. The black on the abdomen of one male was reduced to a basal triangle on the second, third and fourth tergites, the incisures yellowish; there was a basal blackish brown band on the second sternite. Two males were taken at Bear River, Utah, June 17, 1915 (A. K. Fisher) and one at the same place July 11, 1915 by A. W. Wetmore. One female I make a neotype and describe below.

Female. The black color more suffused, the general color amber, with markings indistinct. Like the male in most respects, the wings larger and more infuscated. The squamæ faintly infuscated. The tarsi blackish brown. Length 5 mm.

Neotype, female, in the collection of the U. S. Biological Survey, taken at the mouth of the Bear River, Utah, July 11, 1915 (A. W. Wetmore).

This species is related to *Ogcodes varius* Latreille, judging from a specimen of *O. varius* in the writer's collection from the sandy steppes of Hungary.

Ogcodes pallidipennis Loew. One small specimen, 3 mm. in length, taken by the writer in Mill Creek Canyon, San Bernardino Co. Cal. The specimen was sitting on a rock in the bright sunlight.

The length of *Ogcodes borealis* Cole and *O. niger* Cole was omitted in the original description; it is about 5 mm. in both species.

NEW SPECIES OF NORTH AMERICAN CYRTIDÆ

BY CHARLES W. JOHNSON.

Boston Society of Natural History.

Acrocera stansburyi sp. nov.

♂ ♀ Head black, occiput with whitish tomentum, antennæ yellow. Thorax yellow with three broad narrowly separated black stripes (in two specimens, male and female, the stripes are fused, forming a large trilobed mark), the dorsal stripe is truncate behind at a line corresponding with the base of the wings, the lateral stripes are truncate in front at about the middle of the dorsal stripe, becoming gradually narrower behind and reaching the post-alar callosities, tomentum whitish, pleura on the upper half yellow, with large, irregular, black spots, which are connected with the black of the lower half, humeri and post-alar callosities whitish, scutellum yellow, metanotum black. Abdomen yellow, the second segment is margined anteriorly with black expanding centrally and forming a dorsal triangle, a small dorsal triangle is also present at the base of the third and the fourth, with a small spot usually present on the side of the third, in one specimen there is a narrow margin similar to that on the second segment, ventral segments blackish margined with yellow. Legs white, coxæ yellow, tips of the tarsi and claws black. Wings hyaline, venation as in *O. liturata* Will., squamæ white, halteres yellow. Length, 3mm.

Eight specimens, Stansbury Island, Great Salt Lake, Utah, July 13, 1913 (Hagan and Titus). Holotype and three paratypes in the author's collection. Two paratypes in the collection of Mr. H. R. Hagan, one in the Museum of Comparative Zoology, and one in the U. S. National Museum.

I had referred this to *A. liturata*, but it is evidently quite different, as indicated by the thoracic and abdominal markings and the color of the scutellum. At the request of Mr. Hagan I am dedicating it to Howard Stansbury, who made and elaborate survey of Great Salt Lake and vicinity in 1849 and 1850.

Ocnaea auripilosa sp. nov.

♀ Head black, eyes hairy, antennæ brown, second joint about one half the length of the first (third joint wanting). Thorax, including the pleura and scutellum honey-yellow, shining and covered with quite thick yellow pile, humeri prominent and lighter than the disc of the thorax, behind the shoulder is a whitish stigma, narrowly margined with black, sternum black. Abdomen bright orange-yellow, with short golden pile; the segments have the following blue-black markings,—a spot in the middle of the first, a triangle at the base of the second and third, a square occupying the middle half of the fifth and all of the sixth segment except a narrow margin, venter yellow. Legs yellow with yellow pile, tips of the tarsi dark brown, claws black. Wings hyaline, veins yellow, squamæ white margined with black and fringed with yellow hairs; the first posterior cell is closed and petiolate. Length 11mm., the abdomen is about double the width of the thorax.

One specimen, Tucson, Arizona, March 16, 1916 (J. F. Tucker). Type in the author's collection. It agrees somewhat with *O. micans* Erichson, but its yellow not "fuscous" color, the blue-black abdominal markings and larger size separate it from that species.

Ogocodes vittatus sp. nov.

♀ Head black, antennæ dark brown. Thorax reddish brown, with three broad black stripes, the lateral stripes abbreviated anteriorly and the dorsal stripe obsolete posteriorly, humeri, post-alar callosities, metanotum, and upper parts of the pleura yellow, a blackish spot in front of the base of the wing, and the lower part of the pleura shining black, scutellum black, the base brownish on the sides. Abdomen black, shining, with the posterior margins of the segments narrowly edged with yellow, venter yellow. Legs brownish, the knees yellow, the posterior tibiæ and tarsi black. Wings and squamæ light brown, veins dark brown, knobs of the halteres blackish, stems yellow. Length 4.5mm.

One specimen, Middlesex County, New Jersey, May 19, (Harry B. Weiss). Type in the author's collection. This is readily separated from all the described species by its striped thorax.

THE ZOOLOGICAL RECORD.

The attention of Entomologists throughout the world is called to the fact that, beginning with the Volume for 1922, the preparation of the "Insecta" part of the "Zoological Record," is being undertaken by the Imperial Bureau of Entomology. In order that the Record may be as complete as it is possible to make it, all authors of entomological papers, especially of systematic ones, are requested to send separata of their papers to the Bureau. These are particularly desired in cases where the original journal is one that is not primarily devoted to entomology. All separata should be addressed to:—

*The Assistant Director,
Imperial Bureau of Entomology,
41, Queen's Gate,
London, S. W. 7,
England.*

NORTH AMERICAN DIXIDÆ.

BY O. A. JOHANNSEN.

Cornell Universty, Ithaca, N. Y.

Some years ago I published a key to the species of *Dixa* (Bull. New York State Museum, 68:431, 1903) based largely on the color characters given in the descriptions. Through the kindness of Mr. Nathan Banks I have recently had the opportunity to compare my specimens with the Loew types in the Museum of Comparative Zoology at Cambridge, and now offer a new table which includes three new species.

A study of a series of specimens collected at the same time and place, having similar color characters, and an identical type of hypopygium, therefore presumably one species, shows that the venation of the wings in this genus is subject to some variation, for which allowance must be made in identification. The length of the fork of the media is particularly variable. In one wing of one of the type specimens of *D. fusca* Lw. the petiole and the fork are nearly subequal in length while in the other wing of this specimen and in both wings of the second specimen the petiole is noticeably longer than the anterior branch of the fork. In *D. cornuta* described below, a species having a very characteristically formed clasper, the variation in the proportions is even greater.

Key to species of Dixa.

- a. Costal half of the wing distinctly smoky; a dark spot at the apex of Cu 2; proboscis and scutellum yellow; knob of halteres black. D. C. *marginata* Lw.
- aa. Costal part of the wing not distinctly differentiated in color.
 - b. Tips of the hind tibiæ noticeably enlarged, deep black, sharply contrasting with the remainder of the member; wing veins with clouded margins; proboscis black; halteres yellowish; scutellum fuscous testaceous; terminal clasper segment tapering, mesal process of the basal segment simple, elongate. (fig. 2) Me., Mass., N. Y., *clarata* Lw.

- bb. Tips of hind tibiæ not so sharply differentiated.
- c. Petiole of R2+3 (measured on a straight line from its base to base of fork), less than $\frac{3}{8}$ as long as R3; proboscis, scutellum, and knob of the halteres yellow; crossvein of wing very feebly clouded; r-m crossvein slightly distad of the base of R4+5. N. Y., *terna* Lw.
- cc. With other characters.
 - d. Wing with one or more spots.
 - e. The space between the bases of the cubitus and anal vein, between the branches of the cubitus, and the basal part of the anal lobe infuscated; terminal clasper segment triangular, mesal process of basal segment forked (fig. 1), *californica* n. sp.
 - ee. With but a single, rather distinct spot on the wing.
 - f. Petiole of R 2+3 and R3 subequal in length, wing spot very distinct, veins strongly marked; proboscis and scutellum blackish; halteres sordidly yellow; terminal clasper segment not tapering, truncate apically, mesal process of basal segment forked (fig 6). Me., N. Y. *centralis* Lw.
 - ff. Petiole shorter; proboscis, scutellum, and halteres yellow, N. J.; Md. . . . *notata* Lw.
- dd. Wing spot very indistinct or wanting.
 - e. The r-m crossvein is situated slightly proximad of the base of R4+5 thus intersecting the petiole of the radial sector; Sc endsopposite the base of Rs. St. Vincent Is. *calvula* Will.
 - ee. The r-m crossvein is situated at or slightly distad of the base of R4+5 thus connecting this vein with the media.
 - f. Dorsum of the thorax yellowish with thoracic darker stripes which may be more or less confluent; palpi dark.
 - g. Proboscis yellow; scutellum and halteres blackish; wing veins strongly marked, subcosta ends opposite to base of Rs; thoracic stripes black and more or less confluent, large part of the pleura yellow. Texas . *venosa* Lw.

- gg. Proboscis dark; scutellum yellowish; wing veins not unusually pronounced; intervals between the thoracic stripes yellow.
- h. Fore basitarsus about $2/3$ as long as the tibia; Sc ends proximad of the base of Rs; knob of the halteres dark; basal segment of the clasper of the male with a black, ventrad projecting, and much curved mesal process (fig. 4). N. Y. *cornuta* n. sp.
- hh. Fore basitarsus about $3/4$ as long as the tibia.
- i. Apical segment of the clasper of the male fully as broad beyond the middle as at the base (fig. 3); Sc ends about opposite the base of Rs; distance between the crossveins measured on the media usually not exceeding $1/2$ the length of the m-cu crossvein. N.Y., N. C., Cal. *modesta* Joh.
- ii. Apical segment of the clasper tapering (fig. 7); Sc ends distinctly proximad of the base of Rs; distance between the crossveins about equal to the length of the m-cu crossvein. N. Y. *similis* n. sp.
- ff. Dorsum of the thorax as well as the upper part of the pleura, black; proboscis, halteres and scutellum dark; Sc ends opposite the base of the radial sector. N. Y. *fusca* Lw.

Dixa californica sp. nov.

Male. Head black, proboscis, palpi, and flagellum of antennæ brown, basal antennal segments light brownish. Dorsum of the thorax and upper part of the pleura, yellow; dorsal stripes rich dark brown, nearly confluent, laterals anteriorly, median one posteriorly abbreviated; scutellum, metanotum, and larger part of pleura brown. Abdomen black; the mesal process of the basal clasper segment forked; the apical segment in ventro-lateral aspect more or less triangular, apically with acute angle, mesally with a number of stout black setæ (fig. 1).

Legs yellowish brown, becoming darker towards their extremities; tips of femora and of tibiæ darker; coxæ yellow; fore barsitarsus nearly $7/8$ as long as the tibia. Wings grayish hyaline, a distinct cloud covering the r-m crossvein extending up on the petiole of R_2+3 ; space between the petiole of the cubitus and the anal vein, between the branches of the cubitus, and basal part of the anal angle more or less infuscated; veins yellowish brown; Sc ends opposite the base of Rs, petiole of R_2+3 (measured on a straight line from its base to base of fork) .64 as long as R_3 , petiole of the media measured from the crossvein 1.3 as long as M_1+2 , the distance between the cross veins $2/3$ as long as the m-cu crossvein. Halteres brownish with yellow peduncle. Length 2.5 mm. Type in my collection. Stanford University, Cal., March.

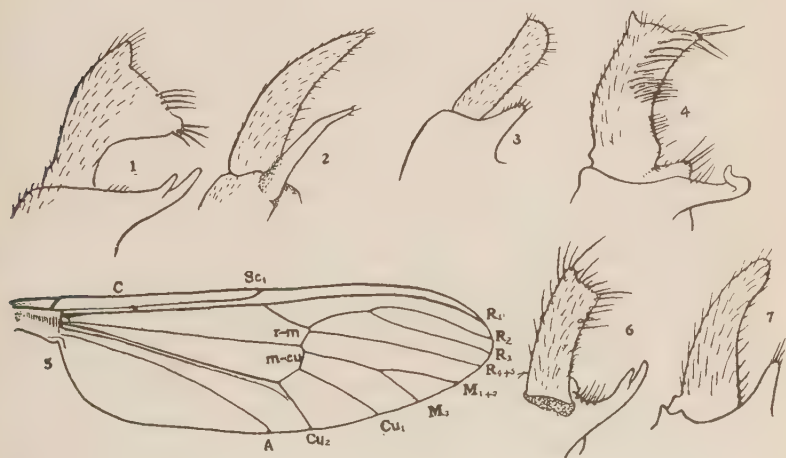


Fig. 1. Claspers of males. Figs. 1, 3, 7 are in ventro-lateral aspect; 2, 4, 6 in ventral aspect. 1. *D. californica*. 2. *D. clavata*. 3. *D. modesta*. 4. *D. cornuta*. 6. *D. centralis*. 7. *D. similis*. 5. Wing of male *D. modesta*.

Dixa cornuta sp. nov.

Male. Head, including proboscis, palpi and antennæ, brown, front shining. Thorax, including scutellum, brownish yellow, with three dull, dark brown lines, the middle one divided by a

hair line, the laterals abbreviated anteriorly; metanotum and sternopleura pale brown. Abdomen blackish; the basal segment of the clasper yellow, moderately swollen, with a black, elongate, ventrad projecting and much curved mesal horn-like process; terminal segment of clasper viewed from the ventral side elongate as shown in fig. 4 with rows of ventro-mesal black spines; when viewed from the side, quadrangular, shaped somewhat like that of *D. californica* (fig. 1) but with the mesal angle much truncated and more spinous. Legs brownish yellow, extreme tips of tibiae and of tarsi darker, the hind tibiae distinctly swollen at tip; fore basitarsus about $2/3$ as long as the corresponding tibia. Wings hyaline, very faintly cinereous, veins yellowish, crossveins not clouded; Sc ends slightly before base of Rs; petiole of $R2+3$ (measured on a straight line from its base to base of fork) about 0.4 as long as R3; petiole of the media measured from the crossvein, about 1.12 as long as $M1+2$. Halteres dark with yellow peduncle. Length 2.5 mm. Holotype in my collection. McLean, N. Y. October.

Female. In coloring like the male. Allotype in my collection. Ithaca, N. Y. August.

Paratypes from Ithaca, N. Y., October, and from Orono, Me., June. In the Cornell University Collection and in the Museum of Comparative Zoology, Cambridge, Mass.

The coloring is rather constant, except in teneral specimens. In the paratypes the venation is rather variable. The ratio measurement, as defined above for the radius, ranges from .36 to .50 in male specimens while the ratio measurements of the media ranges between 1.12 and 2.1. The distance between the bases of the crossveins measured along the media, is in most cases nearly equal to the length of the m-cu crossvein. The fore tibia-tarsus ratio ranges between .61 and .71, with an average of .65.

***Dixa modesta* Joh.**

Too hastily, in the Entomological News (14:302), I declared this species to be the same as *D. clavula* Will. A careful examination of a co-type specimen of Williston's species shows

modesta to be quite distinct, as indicated sufficiently in the key. To my original description may be added that Sc ends about opposite or slightly beyond, or at most but slightly proximad of the base of the radial sector (fig. 5); the petiole of R2+3 (measured in a straight line) is about .55 as long as R3; the petiole of the media, measured from the crossvein, about equal to M1+2; the distance between crossveins along the media less than $1/2$ as long as the m-cu crossvein. In the western specimen there is a very faint suggestion of a cloud on the r-m crossvein. The fore basitarsus is about $3/4$ as long as the tibia. The basal clasper segment is somewhat enlarged, mesal process short with some stout apical setæ; apical segment broadest beyond the middle when viewed from the side, thence tapering to the tip; viewed more ventrally the sides are more or less parallel (fig. 3).

Specimens from Ithaca N. Y., April, May; Black Mts., N. C. May; and S. Jacinto Pk., Cal., August. Type in my collection.

***Dixa similis* sp. nov.**

Closely resembling *D. modesta*, differing chiefly in the characters given in the key.

Male. Head including proboscis, palpi, and antennæ, brown; front shining. Thorax including scutellum, yellow, with three dull dark brown stripes, the middle one divided by a hair line, the laterals abbreviated anteriorly; metanotum and lower part of the pleura brown. Abdomen brown, including the globose basal segment of the clasper whose mesal process is simple and provided with a few stout apical setæ (fig. 7); terminal segment rather tapering when viewed more or less from the side. Legs yellow, tarsi and tips of hind tibiæ a little darker; fore basitarsus about $3/4$ as long as the corresponding tibia. Wings hyaline, very faintly cinereous, veins yellowish, crossvein not clouded; Sc ends in the costa at least the length of the r-m crossvein proximad of the base of the radial sector, the distance between the crossveins measured along the media about equal to the length of the m-cu cross vein; petiole of R2+3 (measured in

a straight line from its base to the base of the fork) about .55 as long as R3; petiole of the media measured from the cross-vein about 1.25 as long as M1+2. Halteres yellow. Tengt, 2.5 mm. Holotype in my collection. Ithaca, N. Y., August.

Female. In coloring like the male. Allotype in my collection. Ithaca, N. Y., August.

Paratypes collected at the same time and place in the Cornell University collection and in the Museum of Comparative Zoology at Cambridge, Mass. The radius ratio in the paratype specimens varies from .44 to .66, the media ratio from 0.8 to 1.3.

TWO NEW SPECIES OF PHORIDÆ FROM BALTIC AMBER.¹

BY CHARLES T. BRUES.

Some years ago, while examining a small series of amber-insects, now in the collections of the museum of the University of Königsberg, I chanced upon a beautifully preserved specimen of the family Phoridæ. This species, which is described below as *Dohrinphora transita* is in a small piece of amber together with an hymenopterous insect representing an undescribed genus of Bethylidæ. A second species included in the same lot proves also to be new.

The occurrence of Phoridæ in Baltic amber was noted many years ago by Behrendt² and soon afterwards Loew³ mentioned the existence of eleven species of this family in amber that had passed through his hands. Much more recently the present writer⁴ has described two species from the Miocene shales of Florissant Colorado. In 1909 Meunier⁵ described and figured a number of species from amber. Unfortunately, it is very difficult to recognize his species as the descriptions are based to a great extent upon characters not generally used, and many important diagnostic characters are not included. In spite of these difficulties I am quite certain that the two species described below are different from any of those dealt with by Meunier.

The first one differs from all previously known species by the presence of a broad, flattened enlargement before the tip of the third longitudinal wing vein, a character which seems to form a transition between the recent species of *Hypocera* and those of the more generalized genera with forked third vein, since a number of species of *Hypocera* show a very similar swelling at the tip of the third vein. They lack the second vein, however, which is present in the fossil species.

¹Contribution from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 219.

²Organische Reste im Bernstein, vol. 1, p. 57 (1845).

³Ueber den Bernstein und die Bernsteinfauna, Progr. Königl. Realsch. Meseritz, 1850. pp. 1-44.

⁴Bull. American Mus. Nat. Hist. vol. 24 pp. 273-275.

⁵Monographie der Leptiden und Phoriden des Bernsteins, Jahrb. Königl. Preuss. Geol., Landesanst., vol. 30, pp. 64-90, 5 pls.

Dohrniphora transita sp. nov.

Sex? Length 3 mm. A stout species with well developed bristles on the hind legs. Two median supra-antennal bristles reclinate, strong, but rather short and divergent. Lower row of four frontal bristles forming a straight transverse line, the bases of the lateral bristles close to the lower angles of the front. Next row forming a curved line, all four bristles equidistant. Upper transverse row normal. Post-ocular cilia strong, not enlarged below. Antennæ rather small, round; arista short and very slender. Mesonotum with a single pair of dorso-central macrochaetae; scutellum with a pair of small lateral bristles and also two stronger bristles on the hind margin. Abdomen completely clouded, so that its structure cannot be observed. Anterior tibiae each with a single bristle at the middle on the front side; middle tibiae each with a similar one at the basal third, and also perhaps just before the tip which is not visible. Hind femora stout, fringed with short hairs along the lower edge. Hind tibia with a strong bristle at the end of the basal third; a pair at the middle, one of these bristles on the outer and the other one on the hind side; also with two shorter bristles just before the tip, and, so far as can be seen, with at least one stout spur. Costal vein not extending beyond the middle of the wing, its cilia delicate and very long, although most of the cilia have been broken off in the single specimen before me. First vein very long, its tip twice as far removed from the mediastinal vein as from the apex of the third vein; on its basal two-thirds it runs almost parallel to the costa, bending sharply forwards apically to meet the costa. Second vein short, the angle of furcation very close to the tip of the third vein. Third vein with a large, oval spot or swelling extending from the fork halfway to the apex of the vein; although this spot scarcely extends over the anterior edge of the vein, it is broadened out behind into a strong bow. Fourth vein straight, except at base, where it is weakly curved; originating opposite the fork of the third; fifth vein almost parallel to the fourth, slightly bent forward on its basal third; sixth and seventh veins present, straight.

Similar in size to *Dohrniphora ablata* Meunier, but the antennæ are small and the apical half of the anterior tibia bears no bristles, while the apical swelling on the third wing-vein described above will serve to distinguish it immediately.

***Dohrniphora loewi* sp. nov.**

♂. Length 2 mm. Apparently brown in color, with the legs light brown; head and abdomen above more or less blackened. All frontal bristles reclinate, strong, but not greatly lengthened. Post-ocular cilia small and densely placed. Antennæ rather small, the third joint globular, almost bare, and only a little shorter than the width of the head. Palpi clouded, their apical bristles which are clearly to be seen, however, are strongly developed and densely placed. Front apparently at least as high as broad, perhaps higher, slightly convex. Cheeks each with a single downwardly directed bristle. Mesonotum bearing only a few fine hairs, as long as wide and strongly convex, on each side with four marginal bristles, of which two lie before and two behind the insertion of the wing; only one pair of dorsocentral macrochætæ present. Scutellum with four marginal bristles of which the anterior pair are slightly weaker. Abdomen one-third longer than the head and thorax together, uniformly narrowed toward the tip; second and sixth segments elongated, the second without tufts of hairs at the sides. Seventh segment, seen from above, furnished with a row of short bristles along the posterior margin. Hypopygium small. Legs not thickened; the hind femora broadened, but without distinct hairs on the lower margin. Front tarsi distinctly thickened, the second and third joints each quadrate; front tibiæ with a single large bristle on the outer side just before the middle. Middle tibiæ with a pair of strong bristles at the basal third; hind tibiæ each with only a single bristle at the basal third and with two apical spurs of which the inner one is much more strongly developed. Wings apparently entirely hyaline; costal vein only one third as long as the wing, thickened toward the apex, with very fine cilia that are visible only under considerable magnification; first vein very long, its tip three times as far from the mediastinal

vein as from the tip of the third vein; second vein entering the costa at a point equidistant from the tips of the first and third veins; fourth vein almost straight, reaching the margin far before the wing-tip; fifth vein almost straight, entering the margin far beyond the wing tip; sixth vein with a sigmoid flexure; seventh vein obsolete.

Type, No. B243, imbedded in a piece of amber with a specimen of an ant.

The present species resembles two amber forms described by Meunier (*op. cit.*) but appears to be quite distinct; from "*Phora*"¹ *inclusa* Meun. it differs in having two basal bristles on the middle tibiae and by being much larger, 2 mm. instead of 1 mm. From *D. concinna* Meun. It differs by the presence of a large bristle near the base of the front tibia and by having only one preapical bristle on the hind tibia.

¹Whether this species is a *Dohrniphora* or *Paraspiniphora* cannot be determined, as the apical portion of the middle tibiae are not visible in the type, according to Meunier's description.

NEW SPECIES OF NORTH AMERICAN
DOLICHOPODIDÆ.

BY M. C. VAN DUZEE.

Buffalo, N. Y.

Nothosympycnus luteipes sp. nov.

Male: length 2 mm. Face very narrow, white. Front dark blue, shining. Antennæ black or brown; third joint rather large, oval; arista twice as long as the antennæ, pointed at tip. Lateral and inferior orbital cilia whitish.

Dorsum of thorax brown, shining, still a little dulled with brown pollen; scutellum blue. Abdomen with the first, second, sides of third segment and the venter yellow; dorsum of third segment, the apical segments and the hypopygium blackish with green reflections; appendages of the hypopygium wholly black, except the yellow penis.

All coxæ and the posterior edge of the pleuræ yellow; coxæ without black hair or bristles, except the erect bristle on outer surface of hind ones. All femora and fore and middle tibiæ yellowish, tips of hind femora and the hind tibiæ more brown or black, still the base and lower edge of the tibiæ are yellowish. Fore tarsi (fig. 4) yellow, blackened from the tip of the third joint; first joint about as long as wide, second as long as the two following joints taken together, fourth distinctly shorter than third and slightly longer than fifth. Middle tarsi (fig. 5) black from the tip of the first joint, which is about as long as the remaining four taken together; tip of first joint with two and basal half of second joint with three long, slender, crooked hairs; second joint a little widened on basal half; third joint as long as second, fourth slightly shorter, fifth still shorter. Hind tarsi wholly blackish, shorter than their tibiæ, first joint shorter than second. Calypters and halteres yellow, the former with black cilia.

Wings brownish gray, narrowed to the root; last section of fifth vein nearly four times the length of the cross-vein.

Described from two males taken at Bar Harbor, Me., July 22, 1914, by C. W. Johnson.

This is almost like *frontalis* Loëw, except in the formation of the tarsi, *frontalis* having the fourth joint of fore tarsi much longer than the third. The middle tarsi of *frontalis* also have the first joint longer than the remaining four taken together, and the second about twice as long as the third.

Campsicnemus wheeleri sp. nov.

Male: Length 2 mm. Face brown, narrow, the eyes nearly touching on upper part, wider below. Palpi and proboscis black. Front black with slight blue reflections. Antennæ black; third joint somewhat conical in outline, about as long as wide; arista basal, twice as long as the antenna. Orbital cilia black above, brownish below.

Dorsum of thorax shining black, slightly dulled with brown pollen; humeri and pleuræ green, the latter with brown pollen; scutellum blue. Abdomen green with purple reflections on the center of the dorsum. Hypopygium small, mostly concealed.

Coxæ blackish, anterior pair more yellowish apically, with black hair on the front surface. Femora and tibiæ brownish yellow; fore and middle femora slightly thickened. Fore tibiæ blackish at base and tip, with two very small bristles above and one below; middle and hind tibiæ darkened apically; middle ones widened and bent as in figure 1; the tip, when viewed from above, is enlarged, blackish, with two yellow spots on the edge (fig. 2). Middle tarsi black, formed as in figures 1 & 2, the first joint is narrowed in the middle when viewed from the side and is enlarged near the apex, terminating in a thumb-like tip; when viewed from above it is slightly tapering, not narrowed in the middle. Last four joints of middle tarsi of nearly equal length and about as long as the first, still the fifth is slightly shorter and has three long hairs at tip. Fore tarsi brown,

first joint as long as the three following taken together, third and fifth of nearly equal length second slightly longer and fourth shorter than third. Hind tarsi brown, first and second joints of equal length, the following joints of slightly decreasing length. Calypters, their cilia and the halteres brown.

Wings tinged with brownish; third and fourth veins parallel beyond the cross-vein, widely separated; last section of fourth vein with a faint brown spot at its basal fourth; last section of fifth being twice as long as the cross-vein; anal angle prominent.

A female which probably belongs with this species differs in the thorax having purple reflections; legs plain and a little more yellow; middle and hind basitarsi yellow with a black tip; calypters and knobs of halteres more yellowish, the former with black cilia; middle tibiæ with two bristles below and several on upper surface. wings with the spot at basal fourth of the last section of fourth vein very conspicuous.

Described from one pair taken in Maine; the holotype, male, was taken at Machias, July 20, 1909, and the allotype a female at Bar Harbor, August 4, 1918; both were taken by C. W. Johnson. He sent them to me with the name *wheeleri* attached but had never described them.

This is very much like *ædipus* Wheeler, but this form has the legs more yellowish; the middle tibiæ of the male of a little different shape; the middle basitarsus contracted in the middle, more enlarged apically, and not ending in a point; their third and fourth joints are also nearly twice as long as in *ædipus*; the brown spot on the fourth vein of the wing is very indistinct in this form. The females of the two species are probably difficult to separate.

***Hercostmus costalis* sp. nov.**

Male: Length 3 mm.; of wing the same. Face of moderate width, silvery white. Front thickly covered with white pollen, so as to conceal the ground color when viewed obliquely.

Antennæ wholly black; third joint not as long as wide, somewhat pointed at tip, arista nearly basal. Lateral and inferior orbital cilia whitish, about five to six of the upper cilia on each side black.

Thorax and abdomen green with bronze reflections; mesonotum dulled with gray or brownish gray, pleuræ with white pollen; abdomen with white pollen on the sides. Hypopygium (fig. 3) black; its lamellæ somewhat angulated and deeply notched at tip, yellow with the edge narrowly black, fringed with bristles which are deep black in color, some of them flattened, and a little enlarged at tip; there appear to be two pairs of inner appendages, one blackish and the other yellow.

Coxæ and femora black; tips of coxæ and narrow tips and the base of all femora yellow, the yellow at base of hind femora sometimes nearly reaches their middle. Middle and hind femora each with one preapical bristle. Tibiæ yellow, posterior pair with their tips blackened for nearly one third their length; fore tibiæ with only two or three slender bristles on upper surface. Fore and middle tarsi black from the tip of the first joints; anterior pair about as long as their tibiæ, their joints in the proportion of 24-8-6-4-6; hind tarsi wholly black, first joint scarcely as long as second. Calypters and halteres yellow, the former with black cilia.

Wings slightly grayish; costa considerably enlarged at tip of first vein, this enlargement tapers quite rapidly at first, more gradually afterwards and extends nearly to the tip; third and fourth veins converge from the cross-vein to their tips, where they are about half as far apart as at the cross-vein; last section of the fifth vein about one and a third times as long as the cross-vein; anal angle rather prominent, its margin nearly parallel with the sixth vein.

Described from four males; I took one at Toronto, Ont., July 4, 1911, one at Port Credit, Ont., July 14, 1918 and one at Ridgeway, Ont., June 22, 1919; the other was taken by J. S. Rogers, at Floodwood, Schoolcroft Co., Mich., July 11, 1915, this is in the collection of Dr. J. M. Aldrich.

Holotype in the author's collection and taken at Toronto, Ont.

Diaphorus spinitalus sp. nov.

Male: Length 3 mm. Face wide, shining green, only slightly dulled with brownish pollen. Palpi rather small, dark yellow; proboscis black. Antennæ black, third joint small, rounded, arista apical. Lower orbits nearly bare, below the head there are a few white bristles.

Thorax and abdomen green with coppery reflections; scutellum with one pair of large bristles and a pair of hairs on the margin. Hypopygium and its appendages small, black, the bristles at tip short.



Fig. 1, *Campsicnemus wheeleri* sp. nov., middle tibia and tarsus; fig. 2, tip of middle tibia and basitarsus of the same, viewed from the side; fig. 3, *Hercostomus costalis* sp. nov., hypopygium; fig. 4, *Nothosympycnus luteipes* sp. nov., fore tarsus; fig. 5, middle tarsus of the same.

Coxæ, legs and feet black, fore and middle knees yellowish. Fore coxæ with white hairs on their anterior surface. Joints of fore tarsi as 21-12-9-3-7; those of hind tarsi as 19-13-8-6-6; first joint of hind tarsi with an erect bristle below near the base, which is about as long as the diameter of the joint. Pulvilli of fore tarsi slightly enlarged.

Wings grayish; first vein reaches two-fifths of the distance to the tip of the second; third and fourth veins nearly parallel, fourth ending just before the apex of the wing; last section of fifth vein nearly twice as long as the cross-vein, which is near the middle of the wing.

Described from one male taken by E. P. Van Duzee, at Strawberry Valley, Eldorado Co., California, August 15, 1912. Type in the California Academy of Sciences.

Diaphorus spinifer Malloch.

Chrysotuss pinifer, Bull. Ill. State Lab. of Nat. Hist., Vol. X, p. 238.

The pulvilli of the fore tarsi are somewhat enlarged in this species and it has very small bristles at the tip of the abdomen, these points together with its slender form are enough to place this in the genus *Diaphorus*, especially as that will bring it near the species described above, which differs from it in having the bristles at the tip of the abdomen larger, the bristle on the hind tarsi smaller, and the palpi much smaller, those of *spinifer* being each as large as the face, or nearly so. *Simplex* Ald. also has a large bristle below at base of hind tarsi, but in that species the third and fourth veins are much bent.

I have taken *spinifer* in Erie Co., N. Y., in August; Ft. Erie, Ont., July; Alpine, San Diego Co., Calif., April; Sacramento, Calif., June; Dr. Aldrich took it at Lewiston, Idaho. It was described from Illinois.

***Dolichopus uliginosus* sp. nov.**

Male: Length 4.7 mm.; of wing 4 mm. Face rather narrow, yellowish. Front shining green. Antennæ wholly black; third joint about as long as wide, scarcely pointed at tip. Orbital cilia black with the four lowest ones on each side yellow.

Thorax shining blue-green with violet reflections; pleuræ slightly dulled with gray pollen. Abdomen shining green with black incisures and with white pollen on its sides. Hypopygium and its lamellæ black, the latter somewhat triangular in outline and about as wide as long.

Coxæ, legs and feet black. Fore coxæ with black hairs on their anterior surface. Middle and hind femora each with one preapical bristle, the latter ciliated on lower inner edge with long black hairs, which appear nearly white in certain lights, the longest of these hairs scarcely as long as the width of the femora. Hind tibiæ with brown pollen on inner surface, which is conspicuous when viewed obliquely, they are distinctly thickened almost from their base. Middle tibiæ with one large bristle just beyond the middle on their lower surface. Anterior tarsi scarcely as long as their tibiæ, the first joint as long as the remaining four taken together, fifth as long as second, fourth joint the shortest. Middle tarsi as long as their tibiæ, the first joint without a bristle above. Calypters yellow with black cilia. Knob of the halteres yellow, their stem brown.

Wings grayish; costa with a slight knot-like enlargement at tip of first vein; fourth vein a little bent just before the middle of its last section; hind margin of wing scarcely indented at tip of fifth vein; anal angle of wings rounded, not prominent, the hind margin being nearly evenly rounded.

Described from one male taken at the Biological Station at Nanaimo, B. C., June 23, 1920, by E. P. Van Duzee. Type in the California Academy of Sciences.

This would run in the table of species in the Bulletin U. S. National Museum No. 116, p. 11, couplet 8, of group C, to

deterus Loew; it very much like that species in the form of the hypopyginal lamellæ and structure of the legs and feet, but differs in having only four or five of the lower orbital cilia yellow, in *deterus* the lower orbital cilia are grayish white, not yellow and the pale cilia reach above the middle of the eye.

***Dolichopus interjectus* sp. nov.**

Male: Length 4 mm.; of wing 3.5 mm. Face rather narrow, silvery white. Front shining green. Antennæ wholly black; third joint a little longer than wide, obtusely pointed at tip. Lower half of the orbital cilia whitish.

Thorax dark shining green; pleuræ with whitish pollen. Abdomen green with slight bronze reflections. Hypopygium black with green reflections; its lamellæ of moderate size, somewhat oval in outline, whitish with rather wide black border on apical margin, which is jagged and bristly, upper edge fringed with a few short black hairs.

Coxæ, legs and feet black; fore and middle trochanters and all knees yellow. Fore coxæ covered with black hairs on their anterior surface. Middle and hind femora each with one preapical bristle, the latter nearly bare below. Hind tibiæ slightly thickened, more so at tip. Fore tarsi about one and a fourth times as long as their tibiæ, first joint fully as long as the following three taken together, fifth nearly as long as the second, fourth the shortest. Middle tibiæ with one large bristle below at apical third. Middle tarsi about equal to their tibiæ in length, their first joint without a bristle above. Calypters and halteres yellow, the latter with whitish cilia.

Wings grayish, tinged with brown in front of third vein; costa with a small knot-like enlargement at tip of first vein; last section of fourth vein a little bent before its middle; hind margin of wing not indented at tip of fifth vein; anal angle of wing prominent.

Female; Agrees with the male, except that the face is wider and the white is scarcely silvery; third antennal joint not longer

than wide; cilia of the calypters about half black; the costa not enlarged at tip of first vein.

Described from two males and one female, taken in Powell Co., Montana, by A. L. Melander. Holotype and allotype in the collection of A. L. Melander.

This would run to *formosus* in the table of species in the U. S. National Museum Bulletin 116, page 11, couplet 5, in group C, but differs from that species in having the hypopygial lamellæ jagged at apex and fringed with short hairs above, *formosus* has the lamellæ fringed above with longer hairs and their apical margin is not at all jagged, the black border is broader in this form than it is in *formosus*. The wing in *interjectus* has a distinct enlargement at tip of first vein and the anal angle is more prominent than in *formosus*.

The female runs in the table of species in the Bulletin, page 28, couplet 23, to *nigrimanus*, but it differs in having the fore tarsus fully as long as the tibiæ, while in *nigrimanus* they are scarcely as long as the tibiæ.

***Dolichopus perplexus* nom. nov.**

Dolichopus misellus Melander, Canadian Entomologist, vol. xxxii, p. 130, 1900. U. S. National Museum Bulletin 116, page 229, 1921. *Dolichopus melanderi* Becker, Zool-Boten. Gesellschaft, Wien, vol. xiii, No. i, page 15, 1921.

Dr. Becker in the American portion of his monograph of the Dolichopodidæ gives the name *melanderi* to *Dolichopus misellus* Melander, as that name was preoccupied by *Dolichopus misellus* Bohem., 1851, but as that name is also preoccupied by the publication of the description of a *Dolichopus melanderi* VanDuzee, Cole & Aldrich, in March, 1921 (U. S. National Museum Bulletin 116, page 70, I would propose the name *perplexus* for this form.

Psilopus longitalus sp. nov.

Male; Length 5 mm. Face bare; fore coxæ and all femora and tibiæ yellow; all tarsi plain with only short hairs and bristles, except the fore basitarsus which has three long slender bristles; middle tibiæ with only minute scattering bristles, which are scarcely as long as the diameter of the tibiæ.

Face bare, blue-green with white pollen. Front shining blue with the upper corners green. Antennæ black; its second joint with a bristle above which is twice as long as the short third joint; arista as long as the height of the head. Lateral and inferior orbital cilia white.

Thorax, scutellum and basal half of first abdominal segment blue, the remainder of the abdomen green with bronze reflections, its incisions black. Bristles of the thorax and abdomen rather short. Hypopygium and its appendages black, formed about as in *sipho* and *furcatus*.

Fore coxæ wholly yellow with yellow hair and two black bristles; middle and hind coxæ and their trochanters black with white hairs and black bristles; femora and tibiæ yellow, posterior tibiæ scarcely blackened at extreme tip. All femora with long yellow hairs below and about three small black bristles near the tip. Anterior tibiæ with four long black bristles on lower posterior edge; middle pair with only very short, scattering bristles; hind tibiæ without bristles. Fore basitarsi equal to their tibiæ in length, and with three long slender bristles on posterior surface, they are yellow with the extreme tip black; last four joints taken together scarcely as long as the first. Middle tarsi with the first joint nearly one and one fourth times as long as their tibiæ, black from the extreme tip of first joint; last four joints taken together about half as long as the first. Hind tarsi black, plain, first joint a little more yellowish and longer than the remaining four joints taken together. Calypters and halteres yellow, the former black with tip and cilia.

Wings with two brown cross-bands connected on the costal edge as far back as the third vein, the basal band covers the

cross-vein but does not reach back of the fifth vein; anterior branch of the fourth vein at right angles to the fourth vein and with the upper bend also a right angle but still it is a little rounded, it ends close to the tip of the third vein.

Female: The bristle on upper edge of second antennal joint twice as long as the third joint; the first joint of fore and middle tarsi is nearly as long as their tibiæ and shorter than the remaining four joints taken together; the anterior branch of the fourth vein of the wing bends backward a little, its upper bend is nearly a right angle and only a little rounded.

Described from one male and eleven females taken at Winnfield, La., July 14, 1918, by G. R. Pilate.

Holotype and allotype in the collection of Prof. James Hine.

This differs from *elegantulus* Becker from Brazil (Zool.-Botan. Gesellschaft, Wien, Vol. xiii, part i, p. 294) in having three long slender bristles on the first joint of fore tarsi, while *elegantulus* has only one long bristle on the fore basitarsus; this species is also larger.

This form belongs to the group with *sipho* Say, *scaber* Leow, and *furcatus* VanDuzee, but differs in there being only very small bristles on the middle tibiæ, it differs from the first two in not having a row of bristles below on middle tibiæ. It also has the first joint of fore and middle tarsi longer than any of the other species. The female differs from that of *sipho* in having the bristles on upper edge of the first antennal joint longer; in *sipho* the anterior branch of fourth vein is much more bent backward and its upper bend is much more broadly rounded, not at all a right angle.

NOTES ON *SINEA DIADEMA* (FABR.); HEMIPTERA

BY GEO. W. BARBER.

Bureau of Entomology, U. S. Dept. of Agriculture.

During the month of September the blossoms of goldenrod are visited by myriads of insects, many of which are attracted there for the food that may be obtained from the flowers. But all is not fortunate, sometimes, for the unwary fly or bee, especially when *Phymata erosa* (Linn.) and spiders such as *Misumena vatia* await them. These, by means of the color with which nature has favored them, are all but indistinguishable from the blossoms. Other predators not so fortunately endowed are frequently present on the flowers, that must for them be excellent hunting grounds. Among these is *Sinea diadema* (Fabr.) one of the most common species of the Reduviidæ, which though not of particularly ferocious appearance to our eyes, must seem sufficiently so to the insect that it attacks.

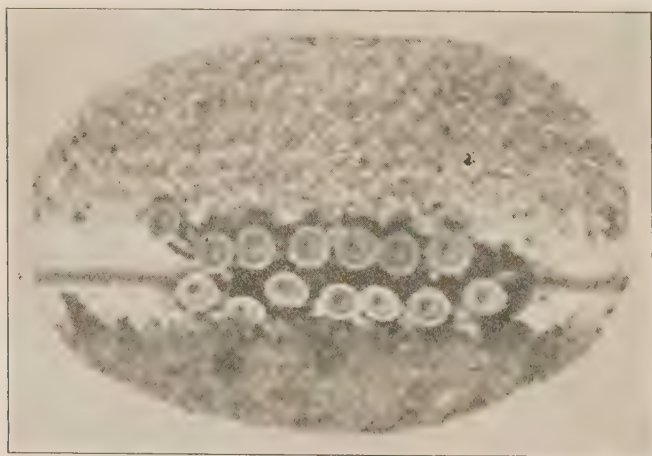


Fig. 1. *Sinea diadema* (Fabr.) Egg-mass enlarged six diameters.

Eggs of this species may be readily obtained by confining the adults in salve boxes. They are deposited usually in small

masses, the individual eggs upright and arranged in two rows. As thus seen under magnification they are very beautiful, the structures of the cap and the collar-like extension of the chorion, which extends outwards from the new laid egg, appearing like delicate lace.

The first instar nymph is a most grotesque little insect with a very large head powerful beak and large, strong front femora provided with numerous stout, sharp spines. The armature is admirably designed for a predatory habit, the head and thorax being covered with plates of very stout, smooth, black chitin against which, we are pleased to believe, a much larger insect might struggle without effect, once it is in the grasp of powerful front femora. Young nymphs that I confined wasted no time on covering themselves with litter and soon became all but indistinguishable. Here again the insect is found superbly fitted for its habit, for on the thorax it bears four sharp, stout spines, than which no structure, perhaps, would better serve for retaining the litter with which it covers itself.

The egg of this species has been described by Ashmead (1895—*Insect Life* VII p. 321) and Heideman (1911—*Proc. Ent. Soc. Wash.* XIII p. 135) and the young nymph by Ashmead. Since I intend to display illustrations, I have enlarged these excellent descriptions somewhat.

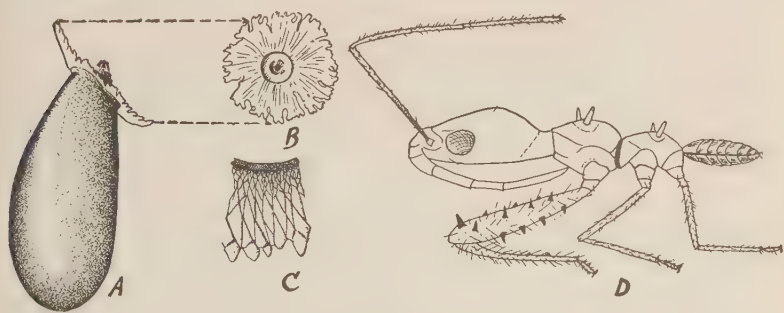


Fig. 2. *Sinea diadema* (Fabr.) A—egg, lateral view; B—egg, dorsal view of the cap and the extension of the chorion; C—Detail structure of the extension of the chorion; D—first instar nymph, lateral view; E—egg mass.

Egg. Length 1.3 mm.; width .6 mm.; diameter of extension of chorion .8 mm. Color brown, minutely granulated, somewhat

shining; central area of cap brown, outer rim brown with minute, regular, white reticulations; extension of the chorion white with dark lines, brown towards the inner edge; shape, sub-elliptical, narrowed towards the cap; central area of the cap raised, cone-like, bluntly rounded at the tip, composed of several scales which fail to meet at the tip; outer rim of the cap flat with minute, regular reticulations; extension of the chorion on the same plane with the outer rim of the cap in new laid eggs, after hatching or drying bending upwards or downwards, squamose, minutely so towards the inner border, gradually coarser outwards, edge sinuate; chorial processes numerous, elongate, club-shaped, within the extension of the chorion.

First Instar Nymph. Length 1.8 mm.; Color dark brown to black, the antennæ, except the basal half of the first segment, the apical half of the middle and posterior tibiæ and all the tarsi brownish; eyes red; body smooth, shining, plates of the head and thorax strong and heavy, closely united; head oblong, as long as the thorax, wider and elevated behind the eyes, then depressed and narrowing into a neck of moderate length; antennæ cylindrical, 4-jointed, as long as or slightly longer than the body, first and last joints subequal, second and third united less than the first, minutely and sparsely ciliate, the basal joint less so, hairs light brown; beak very stout at base, gradually narrowing, attaining the front coxæ; pro and mesothorax each provided with a stout spine each side the median line, as long as one fourth the length of the prothorax and separated by about their own length, directed upwards; anterior legs with very stout femora, enlarged towards the apex, with several stout, sharp spines arranged in rows, those towards the apex larger, each with a hair arising from the apex, sparsely pilose, the hairs long; tibiæ slender with three blunt spines beneath, more densely pilose than the femora; middle and posterior legs somewhat shorter and more slender, moderately pilose; abdomen short, somewhat more than half the length of the thorax, rounded, somewhat flattened, the edges moderately undulated and sparsely fringed with tufts of hairs.

NEW SAW-FLIES, HYMENOPTERA, FROM OREGON.¹

BY ALEX. D. MACGILLIVRAY.

The following new species constitute a part of a collection that has been in hand for several years. The collection was received from Professor A. L. Lovett of the Oregon Agricultural College, Corvallis, Oregon.

Macremphytus lovetti sp. nov.

Female. Body black with the four distal segments of the antennæ, the labrum, the tegulæ, the protibiæ and protarsi, the mesotibiæ and mesotarsi, the metatrochanters, and the metatarsi, white; antennæ with the three proximal segments and part of the fourth, the head except the clypeal suture and the postocellar area, the thorax except the margins of the lobes of the mesonotum and the mesoscutellum, the proximal two-thirds of the metatibiæ, and the abdomen except the saw guides, rufous; antennæ flattened, first and second segments of the flagellum subequal; clypeus roundly emarginate; ocellar basin small, irregular; saw-guides with the dorsal margin straight, the ventral convex, obliquely convexly rounded at apex; wings yellowish, costa reddish, proximal half of stigma white, veins black. Length, 14 mm.

Habitat:—Rock Creek, Corvallis, Oregon; A. L. Lovett' collector. This beautiful large species is similar to *varianus* Norton, but easily separated by the difference in color. It gives me pleasure to name this species after its collector, Professor A. L. Lovett.

Hemitaxonus dediticius sp. nov.

Male. Body black with the labrum, tegulæ, coxæ, and trochanters, white; the legs beyond the trochanters, abdominal segment two for the most part and all of segments three and four, rufous; the clypeus roundly emarginate; antennæ

¹Contributions from the Entomological Laboratories of the University of Illinois. No. 75.

with the first segment of the flagellum slightly longer than the second; ocellar basin distinct, concave; the median fovea pit-like; ocellar and interocellar furrows indicated; vertical furrows distinct; head and thorax finely punctate; wings hyaline, spinulæ distinct, veins, costa, and stigma brownish. Length, 6.5 mm.

Habitat:—Corvallis, Oregon; G. F. Moznette, collector. This species is entirely different in coloration from the eastern *dubitalus* Norton.

Taxonus inclinatus sp. nov.

Male. Body black with the labrum, line on collar, tegulæ, and a fine line on the caudal margin of the abdominal segments, white; the legs beyond the trochanters except an elongate spot on the proximal part of the upper side of the profemora and mesofemora and the tarsi of all the legs more or less, rufous; the clypeus roundly emarginate; antennæ short, the first segment of the flagellum nearly twice as long as the second, the second and third subequal; ocellar basin shallow, divided into two parts, not extending to the median ocellus; ocellar and interocellar furrows deep, the latter extending to and around the median ocellus; the wings hyaline, the veins and stigma uniformly colored. Length, 6.5 mm.

Habitat:—Corvallis, Oregon; received from A. L. Lovett, Hardman collector. This species runs to *nigrasoma* Norton from which its color and structure will readily separate it.

Monophadnoides contortus sp. nov.

Female. Body black with the knees and the tibiæ, except the underside and distal portion of the mesotibiæ and metatibiæ, and more or less of the proximal part of the tarsal segments, white; clypeus truncate; antennæ with the first segment of the flagellum longer than the second, the second longer than the third; head polished, the ocellar basin deep, also with a basin around the median ocellus; ocellar furrow deep, interrupted at

middle; the collar and tegulæ black; the saw-guides finger-shaped, bluntly pointed at middle of apex; wings hyaline, veins including costa brown, caudal half of stigma paler. Length, 6 mm.

Habitat:—Corvallis, Oregon; received from A. L. Lovett, Ballard collector. The interrupted interocellar furrow will serve for the identification of this species.

***Monophadnoides corytus* sp. nov.**

Male. Body black with the prothoracic legs beyond the middle of the femora, the knees of the other legs and beyond to apex, pale; clypeus truncate; antennæ with the first segment of the flagellum distinctly longer than either of the subequal second or third; head and thorax setiferous; ocellar basin almost wanting; median ocellus surrounded by a depressed area connecting with the distinct interocellar furrow; ocellar furrow almost wanting; vertical furrows deep, not reaching caudal aspect of head; wings dusky, spinulæ distinct, veins and costa brownish, stigma with cephalic half brown, caudal half paler. Length, 5 mm.

Habitat:—Corvallis, Oregon; A. L. Lovett, collector. This species can be differentiated from the preceeding by the form of the ocellar furrow.

***Monophadnus aeratus* sp. nov.**

Male. Body black and densely covered with white setæ, protibiæ and mesotibiæ, metatibiæ except black ring at apex, and proximal half of the metabasitarsis, white; clypeus convex, truncate; antennæ with segments of the flagellum swollen, the third and fourth subequal, the second longer than the third, and the first much longer than the second; lateral fovea wanting; ocellar basin deep concavity; reaching half way to the median ocellus, area below median ocellus flat and finely punctate; vertical furrows deep, bipunctiform; ocellar furrow prominent, interocellar furrow extending to the median ocellus; scutellum flat impunctate; wings smoky, larger veins black, smaller brownish, stigma of two colors. Length, 6 mm.

Habitat:—Corvallis, Oregon; received from A. L. Lovett, collected by Godding. This species is related to *planus* and *bipunctatus*.

Monophadnus ruscullus sp. nov.

Male. Body black without any pale marks; clypeus uniformly convex, truncate; antennæ with the first segment of the flagellum subequal or slightly shorter than the second, the second slightly longer than the third; the lateral foveæ wanting; ventral ends of the antennal furrows subpunctiform, with a minute median fovea; front flat adjacent to the median ocellus; ocellar, vertical, and interocellar furrows distinct, the latter surrounding the dorsal portion of the median ocellus; head polished; wings smoky, the veins and the stigma black. Length, 5 mm.

Habitat: Mary's Peak, Corvallis, Oregon; received from A. L. Lovett, Middlekauff collector. The coloration and structure of the head is very different from that of *tilia* Norton.

Periclista electa sp. nov.

Male. Body black with the distal half of the femora, the tibiæ, and the tarsi, shading between yellow and rufous; the clypeus shallowly circularly emarginate; head closely finely roughened; lateral fovea wanting; median fovea indefinite; ocellar basin scarcely defined, frontal crest thin, shelving; vertical furrows punctiform, ocellar furrow wanting, interocellar furrow linear; head not depressed about the median ocellus; thorax polished, setiferous; abdomen with caudal margins of segments with a fine pale margin; wings hyaline, veins and stigma brown. Length, 6 mm.

Habitat:—Corvallis, Oregon; received from A. L. Lovett. This species is related to *media* Norton and its allies.

Hylotoma onerosa sp. nov.

Female. Body black with the labrum, clypeus, mandibles, flagellum of antennæ, legs beyond the apices of the coxæ, and the abdomen beyond the basal plates, rufous; head and thorax

setiferous; setæ white; clypeus angularly emarginate; supraclypeal area with ventral portion elevated with declivous sides, dorsal portion with an angular depression, median fovea in dorsal part, not distant from median ocellus, depression extending almost to median ocellus; antennal, vertical, ocellar, and interocellar furrows obsolete; head and thorax polished; mesocutellum flat; saw-guides greatly swollen, convex on lateral and ventral portions; distal portion obliquely truncated, joining ventral portion in a rounded ridge; wings yellowish, costa colored like membrane, stigma and veins brownish. Length, 10 mm.

Habitat:— Moscow, Idaho, J. M. Aldrich, collector; Revelstoke, British Columbia; R. C. Osborn, collector; Male collected in Okanogan County, Washington, by C. W. Sutton, is evidently the same.

This species is similar to *clavicornis* Fabricius.

TWO NEW MISSISSIPPI ANTS OF THE SUBGENUS
COLOBOPSIS.

BY M. R. SMITH.

Mississippi State Plant Board, A. & M. College, Mississippi.¹

The subgenus *Colobopsis* is a division of the genus *Camponotus*. It includes those ants the major workers and females of which have anteriorly truncated heads. The truncated area may be concave or blunt, in either case the sides are always marginate and well defined. The characters mentioned are so distinct that one has no difficulty in assigning ants of this type to the proper genus.

The subgenus *Colobopsis* in North America seems to have very few species, most of the known forms having been described by Dr. W. M. Wheeler in a paper published in 1904.¹ In this paper the following species are recorded as occurring in North America, namely: *Colobopsis impressus* Roger, *Colobopsis pylartes* Wheeler, *Colobopsis abditus* var. *etiolatus* Wheeler. Since that time Dr. Wheeler has described and added another variety to the known North American forms, this species being *Colobopsis pylartes* var. *hunteri*.

Because of the fact that these ants nest in galls, twigs of trees and the stems of plants they are seldom taken by collectors. This partly accounts for the few known forms. Their habits are also imperfectly known.

In Mississippi three distinct species of *Colobopsis* have been taken, two of which are being described as new in this paper. The writer would feel somewhat hesitant about describing these as new if Dr. Wheeler had not examined the specimens and reviewed the descriptions. The third species of *Colobopsis* found in Mississippi is one that can be assigned to *C. impressus*. All three of these forms are very distinct and it is impossible

¹The American Ants of the Subgenus *Colobopsis*; Bulletin American Museum Natural History Vol. 20, Article 10, pp. 139-158.

for one to confuse them. *C. impressus*, which has a head with distinctly parallel sides, can easily be distinguished from the other two species both of which have heads with the sides diverging anteriorly.

In this section of the state *C. pylartes fraxinicola* and *C. mississippiensis* nest in the twigs of white ash, *Fraxinus americana* Linn. and are rather common species, particularly the latter, which can be found in the twigs of ash with very little effort. Without doubt these species must feed to a large extent if not altogether, on the honey dew excreted by aphids, scale insects, etc. for the writer has on a number of occasions seen the workers lapping up this substance from the leaves of trees and plants. *C. mississippiensis* seems to breed here thruout the winter. Nests examined at various dates during the season always contained eggs and larvæ. Since the winters in Mississippi are rather mild and the ants are well protected from exposure, this is to be expected.

The writer is very grateful to Dr. W. M. Wheeler for examining the specimens described here and for reviewing the technical descriptions. To Professor R. W. Harned the writer wishes to express his appreciation for encouragement given in the study of these and other Mississippi ants and for the generous allotment of time for such work.

***Colobopsis mississippiensis* sp. nov.**

Soldier. Length, 4.5—5mm.

Head subcylindrical, from above rectangular, longer than broad, sides divergent anteriorly, occipital border convex, anterior truncated surface deeply concave, its edges sharply marginate along the sides but less so in the clypeal region. Mandibles small, with flattened ventral surfaces, 4-toothed with a short toothless proximal portion to the blade. Clypeus on the truncated surface about one and a half times longer than broad, upper portion on the truncated area more divergent than the lower portion. There is a distinct median keel running the full

length of the clypeus. On the front, carinæ far apart, with sides converging anteriorly. Eyes moderate, oblong, convex. Antennal scapes curved, slender at the base, gradually enlarging toward their tips. All the funicular joints except the first subequal, first joint almost equal to the next two in length. Thorax robust, pronotum about as broad as long, convex. Meso-epinotal constriction distinct but not deep. Epinotal base and declivity meeting in such a way as to form a decided angle. Petiole low, convex and rounded in front and above, flattened behind, the posterior dorsal edge of the node faintly impressed in the middle but not excised or emarginate. Gaster oblong. Legs short, femora compressed, anterior pair distinctly dilated.

Mandibles and anterior two thirds of head subopaque, the former obscurely longitudinally rugose, the latter coarsely and irregularly reticulate—rugose, with punctate interrugal spaces. On the cheeks and front the sculpture gradually passes over into umbilicately punctate, shallow and scattered foveolæ.

Cheeks and anterior dorsal surface of the head with short, erect, blunt yellowish hairs. There are a few short hairs on the tips of the scapes and femora. Vertex of the head and dorsal and sternal sides of the gaster with longer, erect, whitish hairs.

Anterior two thirds of head including antennæ reddish brown, posterior portion of head blackish brown; thorax and appendages brown; abdomen black.

Worker. Length 3.5-4 mm.

Head longer than broad, a little broader behind than in front, occipital borders and cheeks convex. Mandibles small, 4-toothed. Clypeus nearly square, medianly keeled. Frontal carinæ converging anteriorly. Antennæ proportionately longer than in the soldier; scapes flattened, gradually enlarging toward their tips. Thorax similar to that of the soldier with the exception of the epinotum whose basal surface meets the declivity in such a manner as to form a sharp angle. Petiole low, robust,

with convex anterior and superior surfaces, the posterior dorsal edge of node centrally impressed as in the soldier; posterior surface flat. Gaster oblong. Legs as in the soldier.

Body and appendages shining, distinctly shagreened, the head and thorax more coarsely than the gaster; the cheeks and upper surface of the head with scattered punctures.

Head, legs and gaster covered with delicate white appressed hairs. Clypeus, front, vertex, tips of scapes and femora with a few long, scattered, hairs.

Dark brown; head almost black, gaster black, thorax and appendages lighter than either.

The specimens on which these descriptions are based were taken at Starkville, Mississippi, on January 7th, 1922, in the twigs of white ash, *Fraxinus americana* Linn.

This seems to be a very common species of *Colobopsis* in Mississippi. In every instance observed it has been found nesting in the twigs of white ash. The ants mine out all of the soft portion of the twigs forming longitudinal galleries within the axes of the stems. The galleries may be from a few inches to over a foot in length. The young are reared within these galleries. Small entrance holes in diameter about the size of the soldiers' heads lead from the outside of the twigs to the galleries within. There may be from one to several entrance holes to a nest. No soldiers have been observed using their heads to block these holes as has been noticed in other species of the genus. The female must undoubtedly construct her nest alone and rear the first brood to maturity unaided, as the writer has on a number of occasions found dead or live queens alone in small galleries.

Colobopsis mississippiensis was so named because it is the most common species of the genus in Mississippi. It is very easily recognized by the deeply concave, truncated surface of the head. The sides of the truncated area are very sharp and well defined, except in the dorsal clypeal region. The head of this species when viewed from above has sides that are distinctly

divergent anteriorly with the anterior area of the head very concave or hollowed out. This species seems to be somewhat variable in color. In some specimens the soldiers have abdomens with the basal segment yellowish, in others there is a faint yellowish band on the anterior portion of the second segment, in still others there is a combination of the two. There is variation in the color of the head and thorax, some specimens being much lighter than others. The writer hesitates to assign these specimens to varieties based on color, especially in view of the fact that he has not seen material from many localities.

***Colobopsis pylartes fraxinicola* subsp. nov.**

Soldier. Length, 4.5-5 mm.

Head subcylindrical, viewed from above only slightly longer than broad, noticeably wider in front than behind, with inflated cheeks; occipital border straight or faintly convex. Anterior truncated surface oblique, border blunt on sides of face and mandibles, on the clypeal and adjacent region the truncated passes into the dorsal surface thru a rounded angle. Mandibles with blunter ventral margins than those of *mississippiensis*, blade with 4 distinct teeth and a toothless proximal basal portion. Clypeus projecting above surface of truncated area, broader or more divergent above than below. Eyes, frontal carinae and antennae as in *mississippiensis*. Thorax short, robust. Meso-epinotal constriction distinct and pronounced. The angle formed by the junction of the basal surface of the epinotum and the declivity distinct. Petiole low, robust, with convex anterior and superior surfaces and flat posterior surface; the posterior margin of the superior surface deeply excised or emarginate. Gaster and legs as in *mississippiensis*.

Mandibles and anterior half of head subopaque, the former obscurely longitudinally rugose-punctate, the latter regularly and coarsely reticulate-rugose with punctate interrugal spaces. On the cheeks and front the sculpture gradually passes over into umbilicately punctate, shallow, scattered foveolae. Posterior half of the head and the remainder of body shining, finely shagreened.

Hairs yellowish short, erect and obtuse on the cheeks, longer and more tapering on front and vertex. Gaster above and below with scattered tapering hairs. There are a few short hairs at the tips of the scapes and femora.

Anterior half of head light yellowish, posterior half of head including antennæ dark brown, thorax and appendages brown, abdomen black, with base of first and second segment tinged with yellow.

Worker. Length, 3-3.5 mm.

Head longer than broad, broader behind than in front, with convex occipital border and somewhat less convex sides. Mandibles small, 4 toothed. Clypeus convex, almost square and not noticeably keeled. Antennal scapes flattened, gradually tapering from base to tip. Thorax very deeply constricted at the junction of meso-epinotum. The base of the epinotum in profile appears flattened and forms with the declivity a distinct angle. Petiole low, robust, with convex anterior and superior surfaces, the posterior margin of the latter deeply excised to form two distinct lateral teeth, the posterior surface of the petiole flattened. Gaster oblong. Legs similar to those of the soldier.

Body and appendages shining, distinctly shagreened, the head and thorax more coarsely than the gaster, the cheeks and upper surfaces of the head with scattered punctures.

Head, legs and gaster sparsely covered with delicate, white, appressed hairs. Clypeus, front, vertex, tips of antennæ and femora and the gastric segments with a few scattered and longer hairs.

Dark brown; head darker, mandibles, cheeks and appendages light brown, gaster black.

The ants on which these descriptions are based were collected at Starkville, Mississippi, on January 11, 1922. Like *mississippiensis* this subspecies has a fondness for nesting in white ash but has also been taken by Mr. Andrew Fleming at

Sibley, Mississippi from the twigs of elder. The nesting habits of the two seem to be about the same. Besides the localities mentioned the writer has specimens from Columbus and A. & M. College.

The soldier of this subspecies can be recognized by its peculiarly blunt head, the truncated area of which is oblique in profile. The clypeus on the truncated area projects above the surface very noticeably and it much broader above than below. The punctation and sculpturing on the anterior portion of the head is regular and distinct. When the head of the soldier is viewed from above it appears rectangular, very little broader than long, with divergent sides and inflated cheeks.

The workers can be distinguished by the very deep constriction at the meso-epinotum and by the prominent 2-toothed petiole, both of which are very different from those of *mississippiensis*.

The color in *fraxinicola* is variable as in the preceding species, some specimens being very dark while others are lighter and have more yellow on the base of the gaster and the second segment.

THE VARIETIES OF *MONECPHORA BICINCTA* FROM
THE POINT OF VIEW OF A CYTOLOGIST.

ALICE M. BORING.

Wellesley College.

A curious case of distribution in *Monecphora bicincta* and its variety *ignipecta* was called to my attention by Mr. A. P. Morse in the summer of 1921. Since then I have been studying the chromosomes of these forms to see whether a study of the internal cell phenomena would throw any light on their relationship.

In *Psyche* for February 1921 (vol. 28), Mr. Morse describes the case. The normal range of *Monecphora bicincta* var. *bicincta*, the form with red bands on its wings, is from southern New Jersey south, while the normal range of *Monecphora bicincta* var. *ignipecta*, the common black form, is from southern New Jersey north. Mr. Morse found a number of the variety *bicincta* near Norridgewock, Maine, while the variety *ignipecta* was taken in all other localities around. It is possible that that particular spot is subject to some peculiar environmental conditions which may have caused the banded form to appear there, but it does not seem likely that this aberrant colony could be due to environmental causes, when its environment, at least as far as general climatic conditions are involved, was apparently more like that of the nearby black colonies than of the other banded colonies in the south. What is the genetic status of these two forms? They apparently breed true within their range of distribution, since such aberrant groups as described by Mr. Morse are not frequent. They must then be genetically stable and according to present-day genetical theories there should be some physical basis for their phenotypic differences. Is the change from one to the other great enough to involve a visible cytological differentiation or is it a mutation in one gene of one chromosome as in the races of *Drosophila* and therefore not visible by present cytological methods?

The *Monecphora bicincta* var. *bicincta* material was very kindly sent to me at Woods Hole, Mass., in July, 1921, by Mr. Z. P. Metcalf and Mr. C. O. Eddy of the North Carolina Agricultural Experiment Station. The *M. bicincta* var. *ignipecta* material was collected at Wellesley, Mass., partly by Mr. Morse and partly by myself. I could not find *Monecphora* at Woods Hole, so trusted to obtaining it in September at Wellesley, as it was reported to be a late summer form. But the only specimens found as late as September 15 were females and they had laid their eggs and were much shrivelled in appearance. The material finally studied was collected in July, 1922 at Wellesley. A careful watch was kept from July 1 on for the first forms to appear. The first individual was taken on July 14. By July 21 the species was abundant. They appeared just as their food plant, the bunch-grass, was attaining its full growth. In looking over a field of the grass, one could pick out the *Monecphora* as conspicuous black specks clinging to the grass at various distances from the ground. I did not find any nymphs in their frothy masses of spittle on these plants although I carefully examined the young tufts of grass for some time before the adults appeared. In the *Monecphora bicincta* var. *bicincta* material sent me from North Carolina, the nymphs were on the roots of the food plants. These nymphs were not reared to assure their identity, but they were surrounded by a typical mass of white exudate and those old enough to contain mature sperm cells showed the same cytological conditions as the adults. Probably an examination of the roots of the young bunch-grass around Wellesley in early July, would show the habits of *Monecphora bicincta* var. *ignipecta* to be similar.

The cytological study of the chromosomes of these two varieties reveals them to be identical. This was tested by camera lucida drawings placed side by side. The spermatogonial number is 19, the primary spermatocyte 10, and the secondary spermatocyte 9 and 10. They are like other species of Cercopidæ studied (Boring '13 and Boring & Fogler '15) in having an X chromosome which divides in the second spermatocyte division. The chromosomes have the same absolute size in

the two varieties and show the same relative size differences within the group, 2 largest, 5 medium and 3 smaller (including X). These size differences are not clean-cut enough to be always certain but they are usually discernible in the primary spermatocytes.

Applying these facts to taxonomy, we can say that the cytology of *Monecphora bicincta* var. *bicincta* and var. *ignipecta* corroborates their close relationship. In some insects, as shown by the researches of McClung, Robertson and others on the grasshoppers the chromosome number is not a function of the species or genus but of the family. All species of the Acrididæ have 23 chromosomes and all species of the Tettigidæ have 27. A few apparent exceptions have proved to be due to fusion or breaking of certain chromosomes. The generic and specific differences are expressed in differences in chromosome size and arrangement within the given number. The degree of chromosome similarity has been found to correspond directly to the nearness of taxonomic relationship. But so far among the Cercopidæ studied each species has its own specific chromosome number so that the identity of number in the two varieties of *Monecphora bicincta* would substantiate their classification as varieties of the same species instead of as separate species. *Philænus lineatus* has 15 as reduced number of chromosomes, while *Philænus leucophthalmus* (*spumarius*) has 12; *Aphrophora parallela* has 15 while *Aphrophora quadrinotata* has 14 and *Aphrophora spumaria* (European form) has 12; *Lepyronia quadrangularis* has 11; *Clastoptera obtusa* has 8, while *Clastoptera proteus* has 7; but *Monecphora bicincta* has 10 and *Monecphora ignipecta* also has 10. The change from one to the other is not great enough to involve a visible change in chromosomes.

In two other species of Cercopidæ the cytological study of varietal forms has been recorded; *Philænus leucophthalmus* (*spumarius*) collected from goldenrod and wild sunflower at Woods Hole and the European form, *Aphrophora spumaria*, collected from grass sweepings in a meadow at Eisenach (Boring, Biol. Bull. vol. 24.). In neither case were the varieties accurately identified and named, but a wide range of color and distinctness

of marking was observed and the testes preserved from individuals representing these differences. These specimens of *Philænus* were sent to Mr. Van Duzee at the time, 1912, and identified by him as all belonging to the species *Philænus leucophthalmus* (*spumarius*). From a study of Mr. Van Duzee's Catalogue of the Hemiptera, 1917, I find many varieties of *P. leucophthalmus* recorded. The names of some of these are clearly descriptive of the somatic characters which were conspicuous in the Woods Hole material which I studied cytologically. The chromosome group in all these varietal forms was identical, the same situation as in the two varieties of *Monecphora bicincta*. There is therefore cytological evidence for the present systematic classification of the varieties of *Philænus leucophthalmus* and of *Monecphora bicincta* as varieties instead of as separate species. In the Cercopidæ specific differences seem to be correlated with difference in number of chromosomes while varietal differences do not seem to be expressed in visible differences of any sort in the chromosomes.

Those few specimens of the southern banded form of *Monecphora bicincta* at Norridgewock, Maine, raise other interesting questions, especially as to which was the original form. Evidently the banded form was the first one described. If it is the older, has the black form arisen from it as a result of suffusion? If so, what caused the return to the banded condition in those few specimens at Norridgewock? Can this be explained as a genetic reversion due to the chance recombination of genes? On the other hand, the black form may be the original which occasionally throws off banded mutants, those once thrown off in the south having firmly established themselves, those in Norridgewock being recent mutants. These questions are of course not to be answered by cytological methods. Experimental breeding would answer some. The cytologist must content himself with establishing these two varieties of *Monecphora bicincta* as belonging within one species.

PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.

The annual meeting was held January 9, 1923. The report of the secretary shows that ten meetings were held in 1922 with an average attendance of seventeen persons. Four members were elected, one resigned and two died. A club seal was adopted and is now used on the cover of *Psyche*. A course of six lectures on insects was given in February and March, a report of which is in the record of the April meeting (*Psyche* vol. XXX No. 1, Feb. 1923).

The treasurer's report shows that the Club's income was increased by \$124.55 from the sale of back numbers of *Psyche* so that all expenses of the year were paid.

The following officers for 1923 were nominated and elected.

President	A. P. Morse	Executive Committee	C. W. Johnson
Vice President	R. Heber Howe		O. E. Plath
Secretary	J. H. Emerton		Miss Priscilla Butler
Treasurer	Fred H. Walker	Editor of <i>Psyche</i> C. T. Brues.	

Dr. C. S. Ludlow of the Army Medical Museum, Washington, D. C. was elected a member.

The retiring president, W. M. Wheeler, addressed the club on the relations of some Hemiptera and Diptera with ants. In most cases this relation is that of scavengers, the dipterous larvæ living among the ant larvæ and eating their excrement. Certain fly larvæ coil around ant larvæ near the head and eat food from a pouch in which is it placed by the worker ants. Some adult flies take food directly from the anus of ant larvæ. Other flies hover over adult ants and take food as it passes from the mouth of one ant to another. The hemipterous *Ptilocerus* has unde

the abdomen a spot covered with brilliant orange hairs from which comes a secretion attractive to ants. The *Ptilocerus* stands near moving ants and offers them this secretion which has a narcotic effect. If sufficient is taken the ant soon becomes helpless and the soft parts are eaten by the *Ptilocerus*.

Miss Butler exhibited her collecting coat made of canvas, without collar or sleeves, containing 47 pockets of various sizes and shapes.

C. W. Johnson described a honey bee with a single eye in the center of the head in place of the usual pair, which was shown by Mr. Du Porté of MacDonald College, Canada at the recent meeting of the Entomological Society of America.

At the February meeting, C. T. Brues gave an account of a new, minute hymenopterous insect from Sumatra. It has wide and thin mandibles, concave on the inner side like a pair of clam shells and a long abdominal appendage which may be either an ovipositor or a male copulatory organ.

C. W. Johnson told of various new discoveries among the Diptera, especially in the family Syrphidæ which he had lately reviewed with Mr. Curran of Ottawa.

J. H. Emerton exhibited on the screen a large number of lantern slides of spiders and cobwebs including examples of all the principal families represented in New England.

C. V. Blackburn exhibited some butterfly jewelry of original designs made in Italy.

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CAMBRIDGE ENTOMOLOGICAL CLUB

A regular meeting of the Club is held on the second Tuesday of each month (July, August and September excepted) at 7.45 p. m. at the Bussey Institution, Forest Hills, Boston. The Bussey Institution is one block from the Forest Hills station of both the elevated street cars and the N. Y., N. H. & H. R. R. Entomologists visiting Boston are cordially invited to attend.

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